

Equipment Condition Report

Overall Diagnosis

CRITICAL

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Machine ID:	Flag Gangos - Pump 1 - 13" Filter	Product (h/km):	Lab Sample N°:	GP898
Application:	Hydr system	Machine (h/km):	Label N°:	
Make/Type:		Filter (h/km):	Equipment Ref. N°:	LGP661
Cust. Order N°:		System (l):	Sample Taken:	29/10/2014
Product:	Shell Tellus T 32	Top-up (l):	Sample Received:	03/11/2014

GP898

29/10/2014

CRITICAL

Reported Maintenance:

No maintenance actions mentioned.

Comments Oil Condition:

Visual aspect: dark brown coloured, turbid, with a lot of visual foreign matter.

The water content is not significant: 54 ppm.

The kinematic viscosity @40°C, 32.65 mm²/s, complies with the mentioned ISO VG32 specification limit.

The kinematic viscosity @50°C is 22.78 mm²/s

The kinematic viscosity @60°C is 16.58 mm²/s

The kinematic viscosity @70°C is 12.51 mm²/s

The kinematic viscosity @100°C is 6.32 mm²/s

The oil's acidity is considered acceptable for this application: 0.37 mgKOH/g.

The ICP spectrometry reveals 38 ppm copper, 35 ppm lead, 40 ppm tin and 21 ppm iron.

Comments Machine Condition:

The WPC is 2090, which is considered as very high.

The max. diameter of the ferrous wear particles is limited : 20 µm. Heat treatment reveals that 80% of the ferrous wear particles are low alloy steel

The amount of dark oxides is high with a severity index of 6.

The non-magnetic wear consists of mostly blank metal wear particles. To a lesser extent we observed copper alloy.

The amount of system contaminant particles is too high (global severity index of 8) with crystalline particles (dust, sand), lube degradation products, polymeric matter, carbonaceous material ...

Recommendations:

Without historical data it is difficult to give adequate recommendations, but based on current analysis results we consider the overall condition CRITICAL.

Sample Reported: 06/11/2014 Hilde Lecluyse

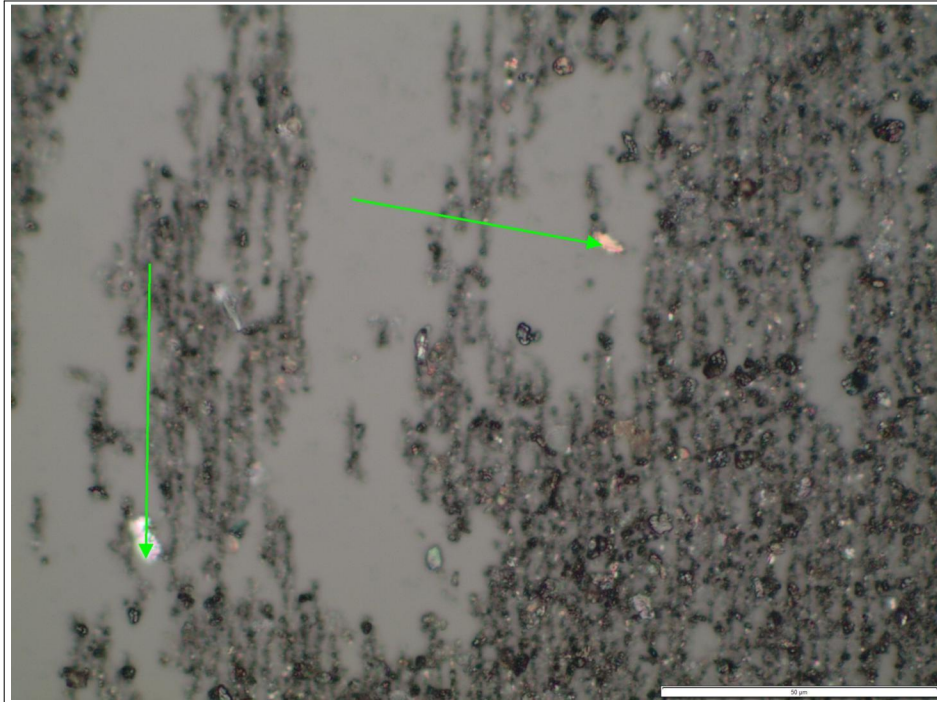
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Test Name	Method	Unit	Results
			GP898
PHYSICAL-CHEMICAL ANALYSIS			
Colour	ASTM-D1500	-	7.5
Visual appearance	OMS 13882	-	turbid
Determination of water (KF)	ASTM-D6304	ppm	54
Kinematic Viscosity @40°C	ASTM-D445	mm²/s	32.65
Kinematic Viscosity @100°C	ASTM-D445	mm²/s	6.320
Acid Number (AN)	ASTM-D664	mg KOH/g	0.37
PQ - Wear index	OMS 14406	-	
ELEMENTAL ANALYSIS			
Aluminium (Al)	ASTM-D5185	ppm	0
Barium (Ba)	ASTM-D5185	ppm	0
Calcium (Ca)	ASTM-D5185	ppm	41
Chromium (Cr)	ASTM-D5185	ppm	0
Copper (Cu)	ASTM-D5185	ppm	38
Iron (Fe)	ASTM-D5185	ppm	21
Magnesium (Mg)	ASTM-D5185	ppm	36
Molybdenum (Mo)	ASTM-D5185	ppm	0
Sodium (Na)	ASTM-D5185	ppm	4
Nickel (Ni)	ASTM-D5185	ppm	0
Phosphorus (P)	ASTM-D5185	ppm	340
Lead (Pb)	ASTM-D5185	ppm	35
Silicon (Si)	ASTM-D5185	ppm	3
Tin (Sn)	ASTM-D5185	ppm	40
Zinc (Zn)	ASTM-D5185	ppm	324
Potassium (K)	ASTM-D5185	ppm	0
WEAR INDEX			
Optical density - large	OMS 13875	-	1,640.0
Optical density - small	OMS 13875	-	450.0
WPC - Wear Index	OMS 13875	-	2,090.0
% Large particles	OMS 13875	%	57
ANALYTICAL FERROGRAPHY			
FERROUS			
Normal rubbing wear (FW-NR)	ASTM-D7690	µm max.	< 15
Severe sliding wear (FW-SS)	ASTM-D7690	µm max.	
Abrasive wear (FW-AW)	ASTM-D7690	µm max.	
Fatigue chunks (FW-FC)	ASTM-D7690	µm max.	20
Fatigue flakes (FW-FF)	ASTM-D7690	µm max.	20
Spheres (FW-S)	ASTM-D7690	µm max.	
Dark oxides index (FW-DOI)	ASTM-D7690	-	6
Red oxides - Rust index (FW-ROI)	ASTM-D7690	-	2
Corrosive wear (FW-Cor)	ASTM-D7690	µm max.	< 1
Ferrous wear - Severity index (FW-SI)	ASTM-D7690	-	8
NON-FERROUS			
White metal alloy wear (NFW-WM)	ASTM-D7690	µm max.	< 15
White metal - Severity index (NFW-WMI)	ASTM-D7690	-	4
Copper alloy wear (NFW-Cu)	ASTM-D7690	µm max.	< 15
Copper alloy index (NFW-Cul)	ASTM-D7690	-	1
Non ferrous - Severity index (NFW-SI)	ASTM-D7690	-	4
CONTAMINANTS			
Crystalline particles index (Con-CPI)	ASTM-D7690	-	8
Amorphous particle index (Con-API)	ASTM-D7690	-	2
Friction polymer severity index (Con-FPI)	ASTM-D7690	-	2
Fibres - Severity index (Con-Fibl)	ASTM-D7690	-	2
Other contaminants index (Con-OCI)	ASTM-D7690	-	4

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Contamination severity index (Con-SI)	ASTM-D7690	-	8

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presence of non-magnetic blank metal and copper alloy.